

TOP TEN

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Introduction of hydrogen-powered aircraft: technological challenges and environmental benefits

Commercial aviation needs to reduce its impact on climate, contributing to the general effort required to achieve the Paris Agreement targets. An important contribution to this task can come with the introduction of hydrogen-powered aircraft. This project is an overall analysis concerning the development of hydrogen-powered aircraft, covering:

- the preliminary sizing of innovative aircraft, accounting for the specificities linked to the integration of hydrogen and its tank onboard;
- an assessment of the environmental benefits linked to the operations of these innovative planes, with a distinction between regional aircraft, whose power comes from fuel cells, and jet aircraft, that are powered via the direct combustion of hydrogen;
- an assessment of the cost of operating a hydrogen production plant in situ aiming to support a specific flight schedule.

These tasks can help identify ways that mitigate the negative impacts of the integration of hydrogen tanks within the fuselage, while satisfying the market demand in terms of aircraft performance. An example of this is given by the results of the preliminary sizing of a hydrogen-burning jet aircraft based on the TLARs of the A320NEO: the design range has been reduced from 4500 km to 2850 km, obtaining an aircraft capable of flying 75% of current narrow-body missions, with a 7.5% RWE gain on the reference mission of 1600 km. The RWE is still worse compared to that of the conventional aircraft, but there are zero CO₂ emissions at aircraft level.

